

REMARKS

Claims 24-26 and 28-45 were pending in this application when the present Final Office Action was mailed (March 6, 2006). In this paper, claims 24-26 have been amended, and claim 45 has been Cancelled without prejudice to pursuing this claim in a continuation, continuation-in-part, or other application. Accordingly, claims 24-26 and 28-44 are currently pending.

In the March 6, 2006 Final Office Action, all the pending claims were rejected. More specifically, the status of the claims in light of this Final Office Action is as follows:

- (A) Claims 25 and 26 stand rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite;
- (B) Claims 24-26 and 28-45 stand rejected under 35 U.S.C. § 112, first paragraph, as allegedly failing to comply with the written description requirement;
- (C) Claims 24-26, 33, 34, 37, 41, 42, and 45 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,089,104 to Kanda et al ("Kanda");
- (D) Claims 30, 31, and 38 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kanda in view of U.S. Patent No. 4,857,802 to Fuyama et al. ("Fuyama");
- (E) Claims 24-26, 28, 29, 32, 33, 35-37, 41, 42, and 45 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,505,986 to Velthaus et al. ("Velthaus") in view of Kanda;
- (F) Claims 30, 31, and 38 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Velthaus in view of Kanda and further in view of Fuyama;

(G) Claim 34 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Velthaus in view of Kanda and further in view of U.S. Patent No. 5,432,015 to Wu et al. ("Wu");

(H) Claims 39, 40, 43, and 44 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Velthaus in view of Kanda and further in view of Fuyama and Wu;

(I) Claims 24, 28, 29, 32, 33, 35-37, and 39-45 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Velthaus in view of U.S. Patent No. 5,372,837 to Shimoyama et al. ("Shimoyama"); and

(J) Claims 25 and 26 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Velthaus in view of Shimoyama and further in view of U.S. Patent No. 5,906,857 to McKee et al. ("McKee").

As a preliminary matter, the undersigned attorney wishes to thank the Examiner for engaging in a telephone interview on April 25, 2006. During the telephone interview, the Examiner and the applicant's representative discussed the claimed subject matter and the cited references. The Examiner agreed that the specification as filed supports the foregoing amendments to the original claims. The Examiner also provisionally agreed that the claims with the foregoing amendments overcome rejections based on the applied references. The following remarks reflect and expand upon the points discussed during the April 25, 2006 telephone interview. As such, applicant respectfully requests that this paper also constitute applicant's Interview Summary.

A. Response to the Section 112, Second Paragraph, Rejections

Claims 25 and 26 were rejected under 35 U.S.C. § 112, second paragraph, as being allegedly indefinite because the specification allegedly fails to provide support for "proximate to the substrate." Without commenting on or conceding the merits of the Examiner's position, applicant has amended claims 25 and 26 to replace the above phrase

with features corresponding to other aspects of the claimed method. Support for the subject matter of amended claims 25 and 26 can be found, for example, at page 8, lines 25 to 28, and page 11, lines 4-7. As agreed to by the Examiner during the April 25, 2006 telephone interview, amended claims 25 and 26 comply with the requirements of Section 112, second paragraph. Accordingly, the Section 112, second paragraph, rejections of claims 25 and 26 should be withdrawn.

B. Response to the Section 112, First Paragraph, Rejections

Claims 24-26 and 28-45 were rejected under 35 U.S.C. § 112, first paragraph, as allegedly failing to comply with the written description requirement because the specification allegedly fails to provide support for "continuously varying the rates of deposition of the components of the deposits." Without commenting on or conceding the merits of the Examiner's position, claims 24-26 have been amended to replace the above phrase with features corresponding to other aspects of the claimed method. Claim 45 has been Cancelled without prejudice to pursuing this claim in a continuation, continuation-in-part, or other application. Support for the subject matter of amended claim 24 can be found, for example, at page 8, lines 30-34, page 9, lines 1-3 and 11-14, page 7, lines 10-16, page 13, lines 15-20. As agreed to by the Examiner during the April 25, 2006 telephone interview, claims 24-26 and 28-44 comply with the requirements of Section 112, first paragraph. Accordingly, the Section 112, first paragraph, rejections of claims 24-26 and 28-44 should be withdrawn.

C. Response to the Section 102(b) Rejections

Claims 24-26, 33, 34, 37, 41, 42, and 45 were rejected under 35 U.S.C. § 102(b) as being anticipated by Kanda. Claim 45 has been Cancelled without prejudice, so the rejection of claim 45 is now moot. Accordingly, the following comments address the rejections of claims 24-26, 33, 34, 37, 41, and 42. Even though applicant respectfully disagrees with the basis of these rejections, applicant has amended independent claim 24 to further clarify the claimed subject matter. Support for the amended subject matter can

be found, for example, at page 4, lines 32-35, page 9, lines 25-30, and page 11, lines 8-15 of the specification as filed. For the reasons discussed below, Kanda does not anticipate these claims. Accordingly, the Section 102(b) rejections of these claims should be withdrawn.

Claim 24, as amended, is directed to a method for depositing a thin film of a pre-determined composition onto a substrate. The composition comprises a ternary, quaternary, or higher composition. The method includes placing a first deposit at a first source and a second deposit at a second source of a vapour deposition apparatus. The first and second deposits are different, and components of the first and second deposits in combination form the pre-determined composition. The method further includes placing first and second coating rate monitors adjacent to the substrate. The first coating rate monitor is shielded from deposition from the second source but open to deposition from the first source, and the second coating rate monitor is shielded from deposition from the first source but open to deposition from the second source. The method further includes simultaneously effecting vapour deposition of the components from the first and second deposits onto the substrate and the first and second coating rate monitors, independently measuring rates of deposition of the components onto the first and second coating rate monitors, and determining temporal variation of the deposition of the components based on the independently measured rates of deposition. The method further includes controlling stoichiometry of the vaporized components using the temporal variation as feedback to ensure constant deposition on the first and second coating rate monitors, thereby obtaining a continuous homogeneous temporal deposition of the composition on the substrate.

Kanda discloses an apparatus having a plurality of ion beam sources or neutral beam sources which can be controlled independently (column 4, lines 13-17). Ion beams from the plurality of ion beam sources are projected to a plurality of targets (Abstract). Sputtered particles from the targets are directed at the substrate to form a multiple-element thin film (Abstract). During the film formation, the composition ratio of sputtered particles is

measured by using atomic absorption spectrometers in the vicinity to the substrate (column 3, lines 18-22).

As agreed to by the Examiner during the April 25, 2006 telephone interview, claim 24 is allowable over Kanda because Kanda fails to teach or suggest at least one feature of claim 24. For example, Kanda does not teach or suggest "placing first and second coating rate monitors adjacent to said substrate," and "independently measuring rates of deposition of said components onto said first and second coating rate monitors." Instead, Kanda discloses measuring concentrations of vapor species using multiple atomic absorption spectrometers. The measured vapor concentrations do not accurately represent rates of deposition onto a substrate because the rates of deposition depend not only on the vapor concentrations but also on other factors, such as the velocity of the vaporized atoms or molecules and/or the sticking coefficient of the deposited species.

In the March 6, 2006 Final Office Action, the Examiner explained that, in Kanda's disclosure, the rate of deposition of each species is at least indirectly monitored because the rate of deposition is based on the vapor concentrations. Even though applicant respectfully disagrees with this characterization, applicant has amended claim 24 to indicate that the rates of deposition of claim 24 are measured using the first and second coating rate monitors positioned adjacent to the substrate. As a result, the deposition rates of claim 24 are directly measured using the first and second coating rate monitors.

As a result, Kanda fails to teach or suggest each and every feature of claim 24. Therefore, in accordance with the Examiner's agreement during the April 25, 2006 interview, the Section 102(b) rejection of claim 24 should be withdrawn. Claims 25, 26, 33, 34, 37, 41, and 42 depend from claim 24. Accordingly, the Section 102(b) rejections of these claims should be withdrawn for the foregoing reasons discussed above and for the additional features of these dependent claims.

D. Response to the Section 103(a) Rejections – Claims 30, 31 and 38

Claims 30, 31 and 38 were rejected under 35 U.S.C. 103(a) as being unpatentable over Kanda in view of Fuyama. As discussed above, Kanda does not teach or suggest each and every limitation of claim 24. Fuyama was cited for disclosing sputtering a thin film EL element onto a substrate, and so does not fill the void identified above. As a result, the combined teachings of Kanda and Fuyama do not teach or suggest each and every element of these claims. Accordingly, these references cannot support a *prima facie* case of obviousness with respect to claims 30, 31 and 38 for the foregoing reasons and for the additional features of these claims, and the Section 103 rejections of these claims should be withdrawn.

E. Response to the Section 103(a) Rejections – Claims 24-26, 28, 29, 32, 33, 35-37, 41, 42, and 45

Claims 24-26, 28, 29, 32, 33, 35-37, 41, 42, and 45 were rejected under 35 U.S.C. 103(a) as being unpatentable over Velthaus in view of Kanda. Claim 45 has been Cancelled without prejudice, so the rejection of claim 45 is now moot. Accordingly, the following comments address the rejections of claims 24-26, 28, 29, 32, 33, 35-37, 41, and 42. For the reasons discussed below, the cited references cannot support a *prima facie* case of obviousness with respect to these claims.

Velthaus is directed to a deposition process, in which the selection of a substrate temperature during deposition is key to eliminate the need for subsequent annealing to form and crystallize the phosphor material. (Abstract) The deposition process is a multi-source process, which permits the control of the individual temperatures and the fluxes of each of the deposition source material to achieve a desired result (Figure 1).

As agreed to by the Examiner during the April 25, 2006 telephone interview, claim 24 is allowable over the combined teachings of Kanda and Velthaus because the combined teachings of these references fail to teach or suggest at least one feature of claim 24. For example, neither reference teaches or suggests "independently measuring

rates of deposition of said components onto said first and second coating rate monitors." Instead, Kanda discloses measuring vapor concentrations using atomic absorption spectrometers, and Velthaus does not disclose any detection means at all. As a result, neither reference discloses measuring rates of deposition using coating rate monitors, nor provides any motivation for such an arrangement.

Further, neither reference teaches or suggests "controlling stoichiometry of said vaporized components using said temporal variation of the deposition of said components as feedback." As described above, Kanda discloses using measured vapor compositions, not temporal variations of the compositions for controlling a desired composition. Velthaus was cited to teach controlling temperature of each source and independently varying the flux from each source. Velthaus teaches controlling the individual flux of evaporated materials only in a feed-forward fashion, and so does not teach or suggest using any temporal variation as a feedback. As a result, Velthaus fails to fill the void identified above. Accordingly, these references cannot support a *prima facie* case of obviousness with respect to claim 24. Claims 25, 26, 28, 29, 32, 33, 35-37, 41, and 42 depend from claim 24. Accordingly, the Section 103(a) rejections of these claims should be withdrawn for the foregoing reasons, and for the additional features of these claims.

F. Response to the Section 103(a) Rejections – Claims 30, 31, and 38

Claims 30, 31, and 38 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Velthaus in view of Kanda and further in view of Fuyama. As discussed above, the combined teachings of Kanda and Velthaus fail to teach or suggest at least one feature of claim 24. Fuyama was cited for disclosing sputtering a thin film EL element onto a substrate, and so does not fill the void identified above. Accordingly, these references cannot support a *prima facie* case of obviousness with respect to claims 30, 31, and 38 for at least the foregoing reasons and for the additional features of these claims. As a result, the Section 103 rejection of these claims should be withdrawn.

G. Response to the Section 103(a) Rejections – Claims 30, 31, and 38

Claim 34 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Velthaus in view of Kanda and further in view of Wu. As discussed above, the combined teachings of Kanda and Velthaus fail to teach or suggest at least one feature of claim 24. Wu was cited for disclosing depositing a dielectric film, and so fails to fill the void identified above. Accordingly, these references cannot support a *prima facie* case of obviousness with respect to claim 34 for at least the foregoing reasons and for the additional features of claim 34. As a result, the Section 103 rejection of claim 34 should be withdrawn.

H. Response to the Section 103(a) Rejections – Claims 39, 40, 43, and 44

Claims 39, 40, 43, and 44 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Velthaus in view of Kanda and further in view of Fuyama and Wu. As discussed above, the combined teachings of Kanda, Velthaus, and Wu fail to teach or suggest at least one feature of claim 24. Fuyama was cited for disclosing depositing a dielectric film, and so fails to fill the void identified above with respect to Kanda, Velthaus, and Wu. Accordingly, these references cannot support a *prima facie* case of obviousness with respect to claims 39, 40, 43 and 44 for at least the foregoing reasons and for the additional features of these claims. As a result, the Section 103 rejection of claims 39, 40, 43 and 44 should be withdrawn.

I. Response to the Section 103(a) Rejections – Claims 39, 40, 43, and 44

Claims 24, 28, 29, 32, 33, 35-37, and 39-45 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Velthaus in view of Shimoyama. Claim 45 has been Cancelled without prejudice, so the rejection of claim 45 is now moot. Accordingly, the following comments address the rejections of claims 24, 28, 29, 32, 33, 35-37, and 39-44. For the reasons discussed below, the cited references cannot support a *prima facie* case of obviousness with respect to these claims.

Shimoyama discloses a deposition apparatus for manufacturing a large-area thin film EL device (Abstract). Shimoyama discloses a vapor deposition apparatus 100 with hearths 12, 15, in which donor pellets 11, 14 are placed (column 11, lines 53-55). Both donor pellets contain the same substances 80, 90, such as an active element mixed with a base material (column 1, lines 39-44). During deposition, surfaces 11a and 14a of the donor pellet 11, 14 are irradiated by electron beams from electron guns 13, 16, and the substances 80, 90 are evaporated to be deposited on the substrate 1 (column 1, lines 55-60). Meanwhile, the substances 80, 90 are continuously deposited on crystal oscillators 17, 21 placed close to the hearths 12, 15 for monitoring. The crystal oscillators 17, 21 continuously supply signals indicating respective deposition rates. (column 1, lines 60-65) In accordance with the signals, a controller 30 controls energy of the electron beams so that the substances 80, 90 make equivalent contributions to the deposition on the substrate 1 such that a light emitting layer formed on the substrate 1 can be uniform in thickness throughout (column 2, lines 1-4). Shimoyama also teaches placing shutters in front of the crystal oscillators such that the oscillators can only be turned on at specified moment and only for a short period of time (Figure 2).

As agreed to by the Examiner during the April 25, 2006 telephone interview, claim 24 is allowable over the combined teachings of Velthaus and Shimoyama because the combined teachings fail to teach or suggest at least one feature of claim 24. For example, neither Velthaus nor Shimoyama teaches or suggests "placing first and second coating rate monitors adjacent to said substrate, said first coating rate monitor being shielded from deposition from the second source but open to deposition from the first source and said second coating rate monitor being shielded from deposition from the first source but open to deposition from the second source." Velthaus does not disclose using coating rate monitors, nor provide any suggestion that such coating rate monitors could be used. Shimoyama discloses "crystal oscillators 17, 21 placed close to the hearths 12, 15 for monitoring," and thus are not "adjacent to said substrate." Even though Shimoyama discloses placing shutters in front of the crystal oscillators, Shimoyama does not disclose

that the shutters can shield deposition from one source but open to deposition from another; instead, Shimoyama's shutters prevent deposition from all sources.

Further, neither reference provides any motivation or suggestion to modify Velthaus' teaching for "controlling stoichiometry of said vaporized components using said temporal variation of the deposition of said components as feedback." As discussed above, Velthaus only discloses controlling individual flux of evaporated materials in a feed-forward fashion. Shimoyama does not disclose controlling stoichiometry at all because the deposited substances 80, 90 are the same. As a result, neither reference provide any motivation or suggestion for controlling stoichiometry of the first and second deposits in a feedback fashion.

Accordingly, these references cannot support a *prima facie* case of obviousness with respect to claim 24. Claims 28, 29, 32, 33, 35-37 and 39-44 depend from claim 24, and so the Section 103(a) rejections of these claims should be withdrawn for the foregoing reasons and for the additional features of these claims.

J. Response to the Section 103(a) Rejections – Claims 39, 40, 43, and 44

Claims 25 and 26 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Velthaus in view of Shimoyama and further in view of McKee. Even though applicant respectfully disagrees with the basis of these rejections, the amendments to claims 25 and 26 discussed above under heading A, as well as the amendments to claim 24 obviate the Section 103 rejections. For example, as discussed above, the combined teachings of Velthaus and Shimoyama fail to teach or suggest each and every feature of claim 24. McKee was cited for disclosing positioning coating rate monitors within each effusion cell, and so fails to fill the void identified above. Accordingly, these references cannot support a *prima facie* case of obviousness with respect to claims 25 and 26 for at least the foregoing reasons and for the additional features of claims 25 and 26. As a result, the Section 103 rejection of claims 25 and 26 should be withdrawn.

K. Conclusion

In view of the foregoing, the claims pending in this application comply with the requirements of 35 U.S.C. § 112 and patentably define over the applied references. A Notice of Allowance is, therefore, respectfully requested. If the Examiner has any questions or believes a telephone conference would expedite prosecution of this application, the Examiner is encouraged to call the undersigned representative at (206) 359-6038.

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Respectfully submitted,

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